

# 55-F-205C

#  
Hwy 401

BLESSINGTON CREEK

THURLOW TWP.

B.A. 462

# RACEY, MACCALLUM AND ASSOCIATES LIMITED

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A COMPANY OWNED, DIRECTED AND OPERATED BY

## Consulting Engineers AND ASSOCIATED STAFF



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**Affiliations:**

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RADIOGRAPHERS  
IRVING P. KRICK, PH. D.,  
METEOROLOGIST  
JACQUES POULIN,  
QUEBEC LAND SURVEYOR  
THE VIBRATION ENGINEERING COMPANY

REPORT NO. S-500-501/55/T-77-1

Toronto, Ontario,  
May 2nd, 1955.

55F 2050

Ontario Department of Highways,  
c/o Messrs. Lazarides, Lount and Partners,  
79 Scollard Street,  
TORONTO, Ontario.

RE: FOUNDATION INVESTIGATION  
THURLOW TWP. BRIDGE NO. 8  
(BLESSINGTON CREEK)

Dear Sirs:

Following your instructions we carried out the drilling of four (4) boreholes at the above site. We wish to report on our findings as follows.

LOCATION OF THE BOREHOLES:

The site of the Thurlow Township Bridge No. 8 is situated where the proposed Highway No. 401 will cross the Blessington Creek, approximately six (6) miles N.E. of Belleville, Ontario. The site is located 3/4 mile from a road and has to be approached over farm-fields.

The location of the three (3) boreholes was shown on a sketch handed over to us by the client. Spotting of the boreholes was done by our engineer in the field. The elevations of the boreholes have not been determined, but it has been observed that little difference in elevation will exist between the three (3) boreholes. When our surveying equipment was sent to the site the flooded area prevented us from levelling. However, should levelling still be required, we will gladly determine the elevations as soon as possible.

The location of the site and of the boreholes is shown on an attached sheet.

REPORT NO. S-500-501/55/T-77-1 Cont'dDRILLING WORK:

The drilling equipment was sent to the site for the first time on March 8th, 1955. Drilling of Borehole No. 1 was finished on March 10th, and the driller's equipment moved to Borehole No. 3. Borehole No. 1 was flooded by about two (2) feet of water, when the drilling operations were completed at this hole. Similar conditions existed at the spots where Boreholes Nos. 2 and 3 had to be drilled. The drilling crew was willing to continue their work, in spite of the unfavourable water level in order to avoid another transportation of the equipment over the fields if work had to be discontinued. However, the water level rose overnight to such an extent that it was necessary to draw the water pump back to dry land. Drilling work could not be resumed before March 15th, on which day Borehole No. 3 was completed. As the water conditions in the creek bed were most unreliable, it was decided to move off the site on March 16th for which operation a boat and horses were needed. The equipment was brought back to Toronto. As the conditions improved, the client decided to have Borehole No. 2 drilled for additional information on the soil and bedrock. The drilling equipment was brought to the site on April 21st, 1955, for the second time. The fields which were mostly frozen during the first performance of drilling work were now extremely soft after thawing. A tractor with trailer was ordered to bring the equipment to and from the site. Borehole No. 2 was completed on April 22nd and the equipment was returned to the road the same day and subsequently returned to the warehouse.

Drilling was performed with a standard diamond core drill, manufactured by CARLAIR and LONGYEAR respectively, operating with AXT-size diamond core bits in rock. The soil was penetrated with 3" extra heavy duty drive pipe. A two-inch split spoon sampler was driven into the ground by a 350 lb. hammer, dropped 12 inches. The number of blows necessary to drive the sampler one foot into the soil was counted. These figures as well as the penetration values for the drive pipe (driven with the same hammer but with 20 inches drop) are shown in the diagram, for each borehole, on the attached Engineering Data Sheets. Diamond core drilling in bedrock was done about ten feet into rock.

DISCUSSION OF RESULTS (See attached Engineering Data Sheets)

The soils on this site represent a river deposited mixture of clay, silt, and and angular limestone gravel of any size up to boulders of more than a foot thickness (Borehole No. 2). The topmost layer of about five feet depth is fairly soft, the penetration value being four (4) blows per foot on the split spoon sampler.

Below five feet depth the soil contains gravel to such an extent that the penetration of the split spoon sampler can no more be considered indicative for the state of compaction or stiffness of the surrounding soils body. Soft pockets may occur as well as aggregates of hard to penetrate gravel and boulders. The latter were encountered in Borehole No. 2 and forced the drillers to discontinue the driving of pipe and proceed by drilling with the diamond bit through coarse gravel and boulders.

REPORT NO. S-500-501/55/T-77-1 Cont'dDISCUSSION OF RESULTS Cont'd

Bedrock was met in Boreholes Nos. 1 and 3 in 18 feet depth, in Borehole No. 2 in 19 feet depth. The surface of bedrock appears to be fairly horizontal, and we do not believe that the difference in depth shown in Borehole No. 2 can be of use to determine a slope of the rock surface. Such unevenness is quite usual for natural surfaces.

The rock consists of very sound and solid crystalline limestone with some solid mudstone interbeds. Bedding appears to be nearly horizontal. Heavy beddedness and the lack of shales characterize this rock. The core recovery in all three boreholes was 100%.

CONCLUSIONS:

The river deposits of this site being quite erratic, we feel that a bridge foundation should not be based on them. The surface of bedrock offers a very sound base for a pile foundation. It may be noted that difficulties to drive the piles may be encountered where the gravel and boulder zone (Borehole No. 2) occurs: the number of blows on the three-inch inside diameter drive pipe exceeded 100 at 6 feet, 200 at 7 feet, 500 from 7 to 9, and 600 from 9 to 10 feet, where diamond core drilling was begun. We consider this material dense enough to carry the pile load as well as the rock surface will do, without the danger of any noticeable differential settlement.

We trust that this information will be satisfactory.

Yours very truly,

RACEY, MACCALLUM AND ASSOCIATES LIMITED

*Karl Tubbasing*

K. Tubbasing, P. Eng.

KI/PW

Original and  
two copies:-

Messrs. Lazarides, Lount and Partners, Toronto, Ont.

c.c.'s: 2 - Racey, MacCallum and Associates Limited, Montreal, P. Q.  
1 - Soils Engineer

Order No. S-500-501/55/T-77 RACEY, MacCULLUM AND ASSOCIATES  
Dated \_\_\_\_\_ Limited

M. LEGER  
Driller

Day Month Year

Foundation Engineering Division

Hole Begun 8/3/55

R. CONSTANTINEAU

Hole Ended 10/3/55

Engineering Data: Sheet for Corehole: 1

Helper

Job Name: THURLOW TWP. BRIDGE NO. 8

K. TUBBESING

Job Located: CROSSING OF PROP. HWY. NO. 401 OVER BLESSINGTON CREEK, ONTARIO

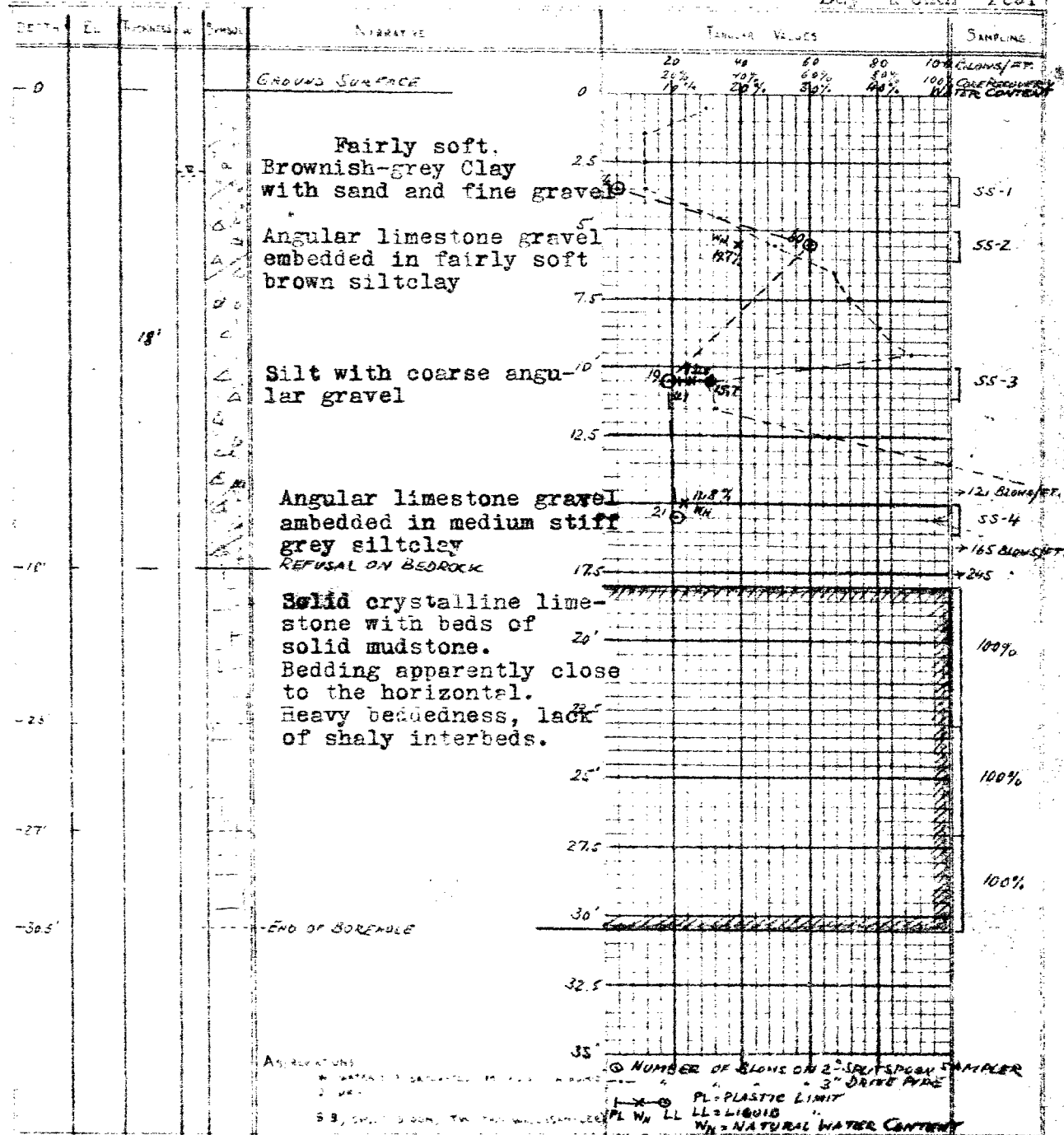
Checked by

Hole Located: AS SHOWN ON ATTACHED SKETCH PLAN.

Hole Elevation: \_\_\_\_\_ Datum: \_\_\_\_\_

23/3/55

Day Month Year



F. LUSK

Limited

Driller

Foundation Engineering Division

W. LINTON

Engineering Data Sheet for Borehole: 2

Helper

B.F.W. & K.T.

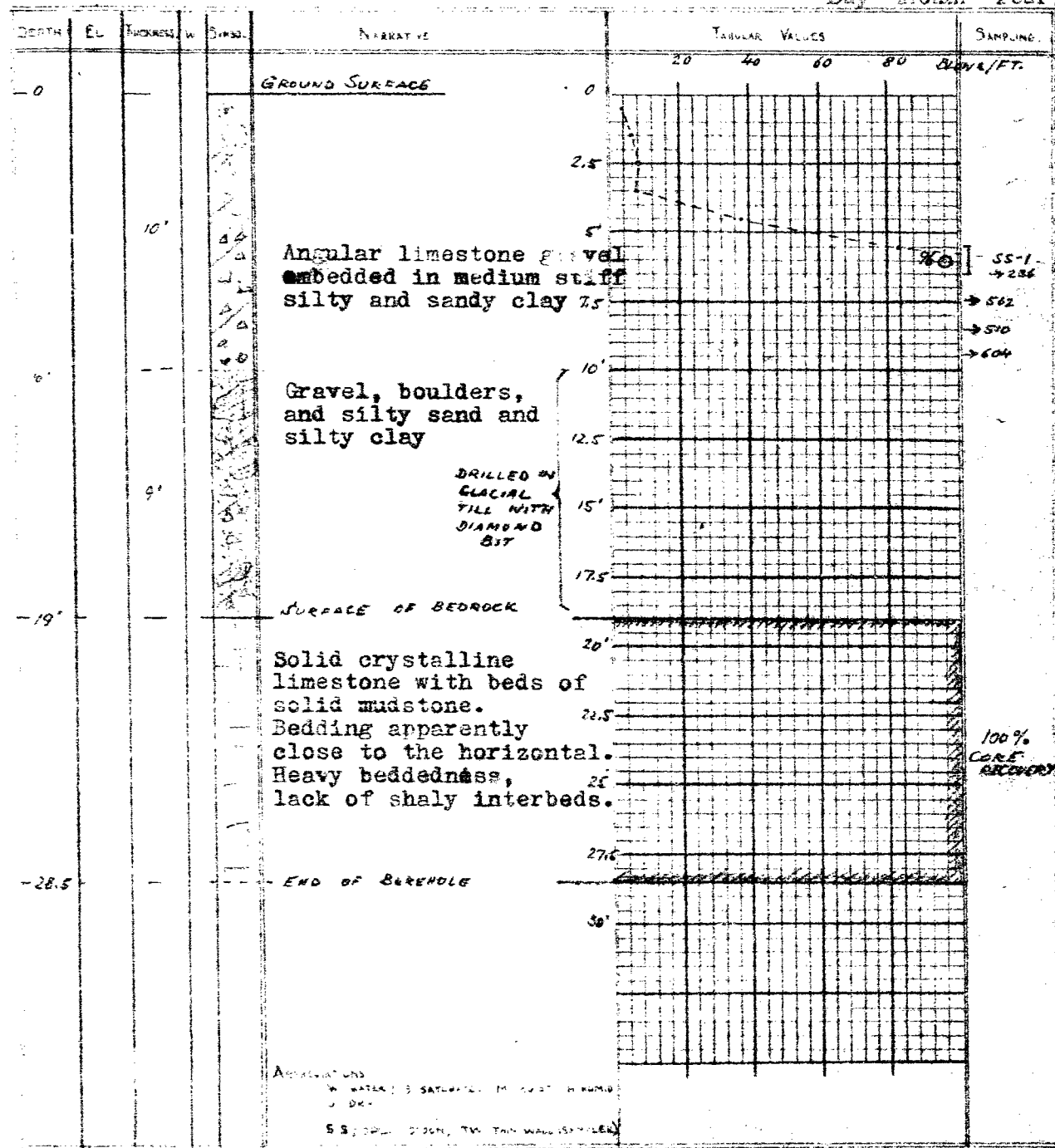
Checked by

Hole Elevation: Return:

Hole Elevation:                      Datum:

25/4/55

Day Month Year



Dated

Limited

M. LEGER

Driller

Day Month Year

Foundation Engineering Division

Hole Begun 11/3/55

R. CONSTANTINEAU

Hole Ended 15/3/55

Engineering Data Sheet for Porehole: 3

Helper

Job Name: THURLOW TWP. BRIDGE NO. 8

K. TUBBESING

Job Located: CROSSING OF PROV. HWY. NO. 401 OVER BLESSINGTON CREEK, ONTARIO

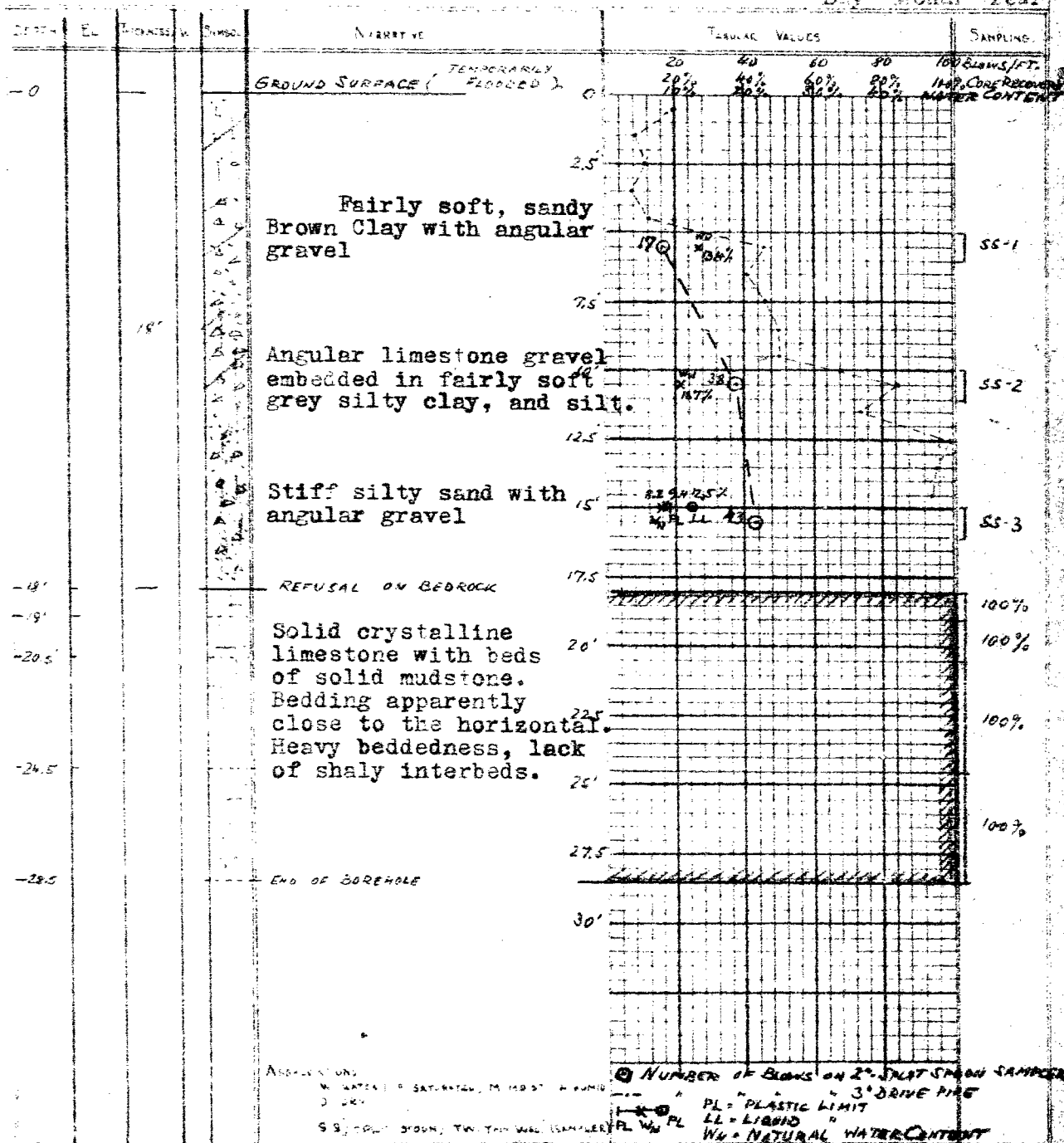
Checked by

Hole Located: AS SHOWN ON ATTACHED SKETCH PLAN

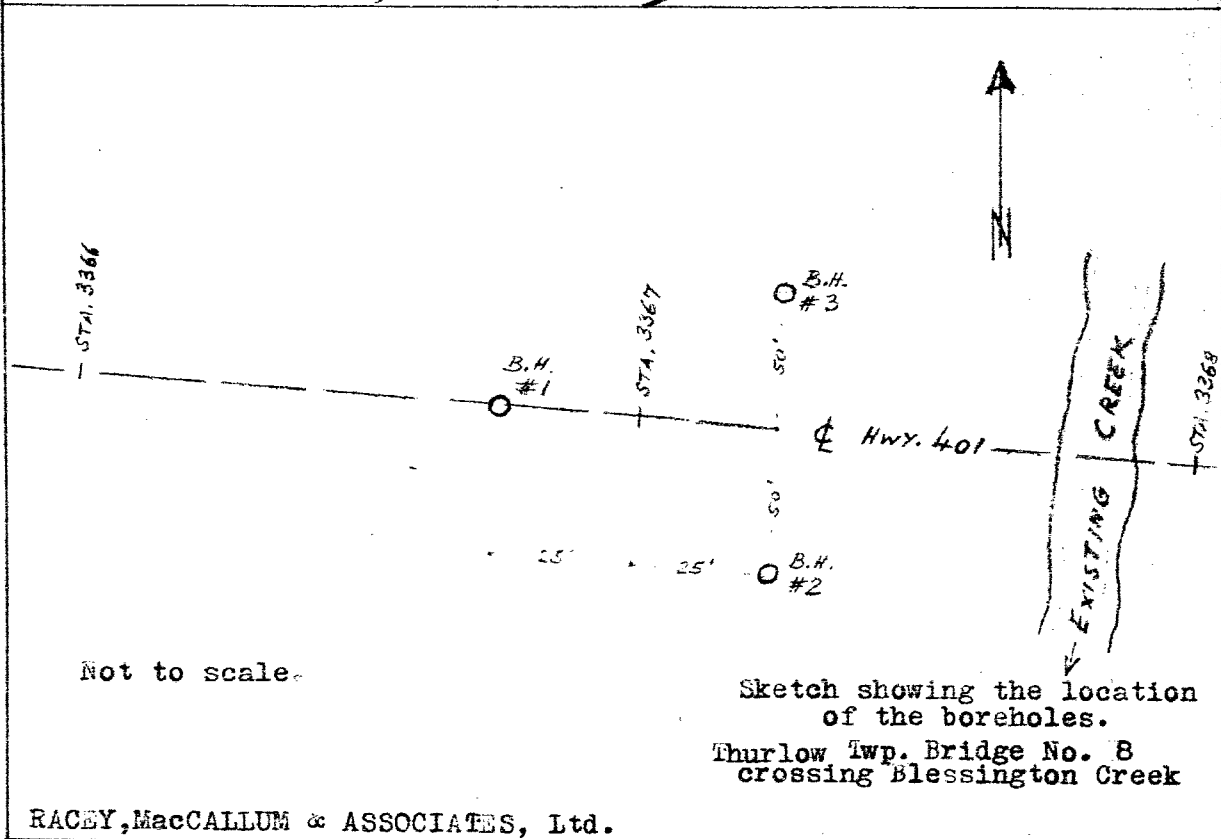
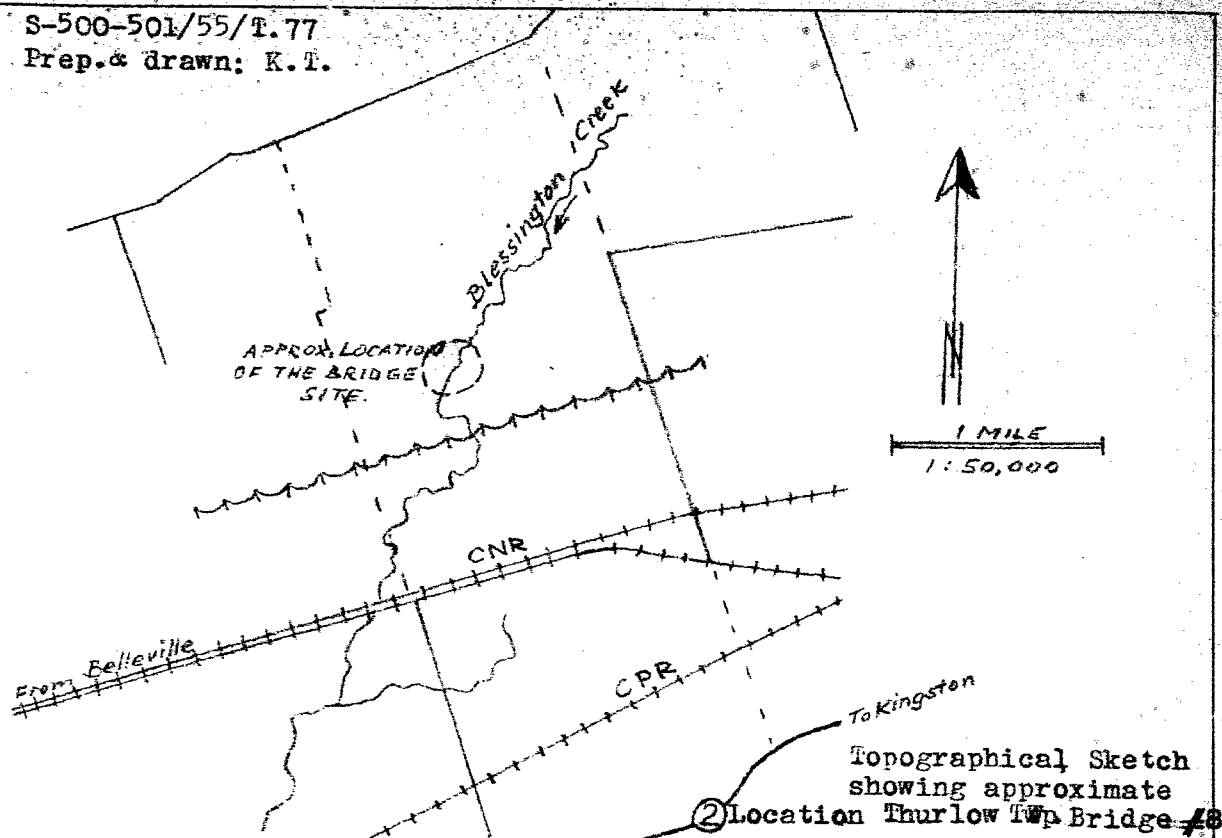
Hole Elevation: Datum:

23/3/55

Day Month Year



S-500-501/55/T.77  
 Prep. & drawn: K.T.



RACEY, MacCALLUM & ASSOCIATES, Ltd.